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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10 036,323	12 31 2001	Philip L. Hower	TI-30010	3224

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EXAMINER

DICKEY, THOMAS L

ART UNIT PAPER NUMBER

2826

DATE MAILED: 03 12 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/036,323

Applicant(s)

HOWER ET AL.

Examiner

Thomas L Dickey

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14, 16-18 and 27-32 is/are pending in the application.
- 4a) Of the above claim(s) 27-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14, 16 and 18 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 10 February 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

1. The amendment filed on 02/10/03 has been entered.

Drawings

2. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 02/10/03 have been approved.

Information Disclosure Statement

3. If applicant is aware of any relevant prior art, he/she requested to cite it on form **PTO-1449** in accordance with the guidelines set forth in M.P.E.P. 609.

Specification

4. The title of the invention is not descriptive. A new title such as "N-CHANNEL LDMOS WITH BURIED P TYPE REGION TO PREVENT PARASITIC BIPOLAR EFFECTS" is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 14 is rejected under 35 U.S.C. 102(e) as being anticipated by HUANG (6,437,399).

Huang discloses an n-channel DMOS transistor source structure comprising an n-type source diffusion 16, ohmically connected to a source metallization 36, a p-type surface body diffusion 14 which laterally surrounds at least part of said source diffusion 16, a conductive gate structure 26 which is capacitively coupled to part of said p-type surface body diffusion 14 to define a channel region therein, a p-type buried body diffusion 35 which underlies said channel and at least part of said surface body diffusion 14; and an ohmic connection between said buried body diffusion 35 and said source metallization 36; whereby said buried body diffusion 35 is capable of diverting hole current to bypass said source diffusion 16, and thereby reducing emission of secondary electrons, and thereby increasing the safe operating area of the device. Note figure 12 and column 2 lines 40-43 and column 3 lines 5-8 of Huang.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over HUANG (6,437,399) in view of MENA ET AL. (4,922,327).

A. With regard to claim 16, Huang discloses an n-channel DMOS transistor source structure comprising an n-type source diffusion 16, ohmically connected to a source metallization 36, a p-type surface body diffusion 14 which laterally surrounds at least part of said source diffusion 16, a conductive gate structure 26 which is capacitively coupled to part of said p-type surface body diffusion 14 to define a channel region therein, a p-type buried body diffusion 35 which underlies said channel and at least part of said surface body diffusion 14; and an ohmic connection between said buried body diffusion 35 and said source metallization 36; whereby said buried body diffusion 35 diverts hole current to bypass said source diffusion 16, and thereby reduces emission of secondary electrons, and thereby increases the safe operating area of the device. Note figure 12 and column 2 lines 40-43 and column 3 lines 5-8 of Huang. Huang does not disclose that the n-channel DMOS transistor source structure comprises a drain region that is laterally spaced from said channel by a drift region, to thereby define a lateral DMOS transistor. However, Mena et al. discloses an n-channel DMOS transistor source structure comprising a drain region 24 that is laterally spaced from a channel 20 by a drift region 22a, to thereby define a lateral DMOS transistor. Note figure 1 of Mena et al. Therefore, it would have been obvious to a person having skill in the art to replace the

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vertical drain of Huang's n-channel DMOS transistor source structure with the drain region which is laterally spaced from said channel by a drift region, to thereby define a lateral DMOS transistor such as taught by Mena et al. in order to maintain a relatively high breakdown voltage while exhibiting a relatively low on-resistance, and preventing parasitic breakdown in a LDMOS.

B. With regard to claim 18, Huang discloses an n-channel DMOS transistor source structure comprising an n-type source diffusion 16, ohmically connected to a source metallization 36, a p-type surface body diffusion 14 which laterally surrounds at least part of said source diffusion 16, a conductive gate structure 26 which is capacitively coupled to part of said p-type surface body diffusion 14 to define a channel region therein, a p-type buried body diffusion 35 which underlies said channel and at least part of said surface body diffusion 14; and an ohmic connection between said buried body diffusion 35 and said source metallization 36; whereby said buried body diffusion 35 diverts hole current to bypass said source diffusion 16, and thereby reduces emission of secondary electrons, and thereby increases the safe operating area of the device. Note figure 12 and column 2 lines 40-43 and column 3 lines 5-8 of Huang. Huang does not disclose that the n-channel DMOS transistor source structure further comprises a drain structure which includes at least one shallow n-well diffusion laterally surrounding an n+ drain diffusion, and which is laterally spaced from said channel by a drift region, to thereby define a lateral DMOS transistor. However, Mena et al. discloses an n-channel DMOS transistor source structure comprising a drain structure 116-128-140 which in-

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cludes at least one shallow n-well diffusion 128 laterally surrounding an n+ drain diffusion 140, and which is laterally spaced from said channel by a drift region 116, to thereby define a lateral DMOS transistor. Note figures 4-7 of Mena et al. Therefore, it would have been obvious to a person having skill in the art to replace the vertical drain of Huang's n-channel DMOS transistor source structure with the drain structure which includes at least one shallow n-well diffusion laterally surrounding an n+ drain diffusion, and which is laterally spaced from said channel by a drift region, to thereby define a lateral DMOS transistor such as taught by Mena et al. in order to maintain a relatively high breakdown voltage while exhibiting a relatively low on-resistance, and preventing parasitic breakdown in a LDMOS.

Allowable Subject Matter

7. Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 703-308-0980. The examiner can normally be reached on Mon-Thu 8-6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to

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Thomas L Dickey whose telephone number is 703-308-0980. The examiner can normally be reached on Mon-Thu 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

TLD
02/2003

Thomas L Dickey